

REMARKS

Applicant has corrected the typo to the specification referenced by the Examiner with regard to the downstream expansion plug 26, referenced on page 7, line 27, and submits that this objection should now be withdrawn. Applicant has also amended portions of the specification for clarity and consistency. No new matter has been added.

Claims 1-7 stand rejected under 35 U.S.C. 103(a) as being unpatentable over WO 97/06940 to Chapman (U.S. Patent No. 6,153,132 hereinafter, 'Chapman '132'). Claims 8-12 and 15-17 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Chapman '132. Claims 13 and 14 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Chapman '132 in view of DE 19843340 to Ulrich (corresponding to U.S. Patent No. 7,335,010 to Ulrich, hereinafter, 'Ulrich').

New claims 19-47 are directed to the same elected subject matter of previously recited claims 1-18. Applicant traverses the rejections of record as the cited art does not disclose or suggest the limitations of new claims 19-47.

In particular, claim 19 requires a continuous process for producing oriented plastic tube which includes, inter alia:

providing a variable diameter calibrator which is adjustable in diameter;
adjusting the diameter of the variable diameter calibrator to a first diameter;
in a first mode with the variable diameter calibrator adjusted to the first diameter,
extruding a plastic tube and passing the plastic tube through the variable diameter
calibrator, wherein the plastic tube passing through the variable diameter calibrator in the
first mode has a first tube outside diameter;

**adjusting the diameter of the variable diameter calibrator to a second
diameter different from the first diameter;** and
in a second mode with the variable diameter calibrator adjusted to the second
diameter, extruding the plastic tube and passing the plastic tube through the variable

diameter calibrator, wherein the plastic tube passing through the variable diameter calibrator in the second mode has a second tube outside diameter different from the first tube outside diameter,

wherein **extrusion of the plastic tube in the first and second modes occurs prior to temperature conditioning, diametrically expanding, and cooling to produce the oriented plastic tube**, the first tube outside diameter results in the oriented plastic tube having a first circumferential draw ratio, and the second tube outside diameter results in the oriented plastic tube having a second circumferential draw ratio different from the first circumferential draw ratio.

Claim 19 requires providing a variable diameter calibrator which is adjustable in diameter, adjusting the diameter of the variable diameter calibrator to a first diameter, extruding a plastic tube through the variable diameter calibrator with the variable diameter calibrator set to the first diameter, adjusting the variable diameter calibrator to a second diameter different from the first diameter, and extruding the plastic tube through the variable diameter calibrator with the variable diameter calibrator set to the second diameter. Claim 19 also requires that the adjustment of the variable diameter calibrator change the circumferential draw on the extruded tube. Nowhere does the cited art disclose or suggest these limitations.

Chapman '132 discloses a sizing sleeve 13 (FIG. 1) which is a fixed diameter device used to correct the diameter of the extruded tube. Such a sizing sleeve 13 is inherently incapable of changing the extruded tube diameter for control of circumferential draw. By disclosing a fixed sizing sleeve 13 for correcting the diameter of an extruded tube, Chapman '132 fails to disclose or suggest a variable calibrator diameter which can be adjusted to first and second diameters with the same plastic tube extruded therethrough, resulting in oriented plastic tube with different first and second circumferential draw ratios as required by claim 19.

Moreover, even variable calibrators used to control the final diameter of plastic tubes during production are typically only capable of diameter adjustments which compensate for wear

and shrinkage, such as, for example, 0.5 to 1 mm differences in tube diameter (see Applicant's specification, page 7, lines 10-21). Such variable calibrators are not the variable diameter calibrator of claim 19 as they are not used to control or change the circumferential draw of oriented plastic tube, which requires significantly larger changes in diameter (see Applicant's Specification, page 9, lines 6-8). The Examiner has not identified any teaching, suggestion, or motivation for a person of ordinary skill in the art to use a variable diameter calibrator for controlling or changing the circumferential draw of oriented plastic tube as claimed in claim 19.

For these reasons, Applicant submits that claim 19 is patentable over the cited art.

Claims 20-26, which depend from claim 19, are patentable for the same reasons that claim 19 is patentable, and for reciting additional limitations that are not shown or suggested in the cited art.

Claim 27 requires, inter alia, providing a variable diameter calibrator which is adjustable in diameter; in a first mode, adjusting the variable diameter calibrator to a first diameter, and extruding a plastic tube to a first wall thickness and through the variable diameter calibrator with a first tube outside diameter; and in a second mode, extruding the plastic tube to a second wall thickness, adjusting the diameter of the variable diameter calibrator to a compensatory diameter, and passing the plastic tube of the second wall thickness through the variable diameter calibrator with a compensatory tube outside diameter, wherein the first tube outside diameter and the compensatory tube outside diameter result in the oriented plastic tube **having different oriented plastic tube wall thicknesses in the first and second modes and the same circumferential**

draw ratio in the first and second modes. Nowhere does the cited art disclose or suggest these limitations.

Changing the wall thickness of an extruded tube while maintaining the same circumferential draw on the tube by using the variable diameter calibrator to create a large change in diameter prior to temperature conditioning, diametrically expanding, and cooling the tube is not contemplated by any of the cited art.

Applicant also notes that the Examiner's statement on page 5 of the present Office Action that in Chapman '132, "the circumferential draw is the axial draw," is not correct. When producing oriented plastic pipe, circumferential draw is applied orthogonal to the direction of axial draw, and by different means. Axial draw is a lengthwise pulling or drawing of the pipe which is achieved by haul-off tractors. Circumferential draw is achieved by expanding the tube diameter/circumference (e.g., diametric expansion). Circumferential draw with molecular orientation of the plastic improves the hoop strength of the expanded tube. Control of circumferential draw by adjustment of a variable diameter calibrator is not shown or suggested in the cited art.

Claim 27 requires the use of a variable diameter calibrator to control the circumferential draw ratio of the oriented plastic tube when the **diameter and wall thickness** of the oriented plastic tube are varied during the continuous process. This is highly desirable in setting the structural strength of the drawn and expanded oriented plastic tube which subsequently results from the continuous process. Such **control of circumferential draw achieved through varying**

the variable diameter calibrator while the wall thickness of the pipe is changed is not disclosed or suggested in the cited art.

For these reasons, it is submitted that claim 27 is patentable over the cited art.

Claims 28-31, which depend from claim 27, are patentable for the same reasons that claim 27 is patentable, and for reciting additional limitations that are not shown or suggested in the cited art.

Claim 32 is patentable for the same reasons that claim 27 is patentable. Claims 33-40, which depend from claim 32, are patentable for the same reasons that claim 32 is patentable, and for reciting additional limitations which are not shown or suggested in the cited art.

To accomplish the limitations of claim 41, one skilled in the art would need to identify and implement a variable diameter calibrator which could accommodate, in a continuous process, an extruded tube having a start-up diameter for facilitating passage of the tube over the diametrical expansion apparatus, and extruding and calibrating the tube to a different operating diameter. These limitations are not shown or suggested in the cited art. Thus, claim 42 is patentable over the cited art.

Claims 42-47, which depend from claim 41, are patentable for the same reasons that claim 41 is patentable, and for reciting additional limitations which are not disclosed or suggested in the cited art.

Should any issues remain outstanding, the Examiner is invited to call the undersigned attorney of record so that the case may proceed expeditiously to allowance.

Respectfully submitted,

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